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➤TRENDS➤ NOW CHANGING THE WORLD: TECHNOLOGY, THE WORKPLACE, MANAGEMENT, AND INSTITUTIONS

by Marvin J. Cetron and Owen Davies

EDITOR'S NOTE

All careers and businesses will be transformed by new technologies in often unpredictable ways. The era of the entrepreneur will make "boutique" businesses more competitive with the behemoths, as mid-sized institutions get squeezed out. And medical breakthroughs and the ongoing health movement will enhance--and extend--people's lives. These are a few of the major forces shaping the next 20 years and beyond. Veteran forecaster Marvin Cetron of Forecasting International Ltd. and science writer Owen Davies describe the implications of these ➤**trends**➤ for our long-term future.

For some four decades, Forecasting International Ltd. has conducted an ongoing study of the forces changing our world. About 10 years ago, Cetron and Davies condensed their observations into reports for THE □**FUTURIST**□ covering key aspects of the economy, technology, business, and society.

Those early forecasts have often been updated and extended. In this article, the second of two excerpts from their latest report, the authors reconsider the □**trends**□ from their previous work and focus on major □**trends**□ that are now changing the world. For each trend, they also offer a succinct conclusion about

its implications for the future and how it may affect individuals and organizations, including policy makers.

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TECHNOLOGY □TRENDS□

TECHNOLOGY INCREASINGLY DOMINATES BOTH THE ECONOMY AND SOCIETY.

- In all fields, the previous state of the art is being replaced by new high-tech developments ever faster.
- Technological advances such as more powerful personal computers, robotics, and CAD/CAM directly affect the way people live and work. Computers also add an estimated 1.5% to the U.S. economy.
- Mundane commercial and service jobs, environmentally dangerous jobs, and assembly and repair of space-station components in orbit increasingly will be done by robots. Personal robots will appear in the home by 2010.
- Computers are fast becoming part of our environment, rather than just tools we use for specific tasks. With wireless modems, portable computers give us access to networked data wherever we go.
- Global sales of packaged software are growing at a rate of more than 15% per year.
- Satellite-based telephone systems and Internet connections and other wireless links will simplify relocation of personnel, minimize delays in accomplishing new installations, and let terminals travel with the user instead of forcing the user to seek out the terminal.

- By 2005, artificial intelligence, data mining, and virtual reality will help most companies and government agencies to assimilate data and solve problems beyond the range of today's computers. AI's uses include robotics, machine vision, voice recognition, speech synthesis, electronic data processing, health and human services, administration, and airline pilot assistance.

- By 2005, expert systems will permeate manufacturing, energy prospecting, automotive diagnostics, medicine, insurance underwriting, and law enforcement.

- Superconductors operating at or near room temperature will be in commercial use soon after 2015. Products will include supercomputers the size of three-pound coffee cans, electric motors 75% smaller and lighter than those of today, practical hydrogen-fusion power plants, electrical storage facilities with no heat loss, and noninvasive analyzers that can chart the interaction of brain cells.

- The engineering, technology, and health industries will all grow rapidly, and many new biotechnology jobs will open up.

IMPLICATIONS: New technologies often require a higher level of education and training to use them effectively. They also provide dozens of new opportunities to create businesses and jobs.

Automation will continue to cut the cost of many services and products, making it possible for companies to reduce prices while still improving profits. This will be critical to business survival as the Internet pushes the price of most products to the commodity level.

New technology also will make it easier for industry to minimize and capture its effluent, a crucial ability in the environmentally conscious future.

RESEARCH AND DEVELOPMENT PLAYS A GROWING ROLE IN THE ECONOMY.

- R&D outlays as a percentage of GNP rose steadily in the decade after 1978, then stabilized in 1988. Future increases will pace the growth of the GNP.

- R&D outlays are growing most rapidly in the information technology, electronics, biotechnology, aerospace, pharmaceuticals, and chemical industries. One result of this can be seen in the prosperity of the NASDAQ stock market, which emphasizes research-oriented, long-term payoff industries.

- Jobs created by high-tech exports are more than replacing those lost to foreign competition under the North American Free Trade Agreement and similar agreements, providing a net gain in employment.

IMPLICATIONS: New technology will continue to transform the way we live and work. The demand for scientists, engineers, and technicians will continue to grow, particularly in fields where research promises an immediate business payoff.

Low-wage countries such as China will take low-wage jobs from advanced industrialized countries such as the United States, but those jobs will be replaced by high-wage jobs in telecommunications and other fields.

Countries like India, China, and Russia will continue to suffer a substantial brain drain as those with high-tech skills emigrate to the United States and other high-demand, high-wage destinations. This will adversely affect the economies of the "donor" countries.

ADVANCES IN TRANSPORTATION TECHNOLOGY WILL SPEED TRAVEL AND SHIPPING, BOTH ON LAND AND IN THE AIR.

- By 2010, New York, Tokyo, and Frankfurt will emerge as transfer points for passengers of high-speed, large-capacity supersonic planes.

- Following European practice, the U.S. airline industry will begin to replace the spokes of its existing hub-and-spoke system with high-speed trains for journeys of 100 to 150 miles.

- The average life of a car in the United States soon will be 22 years. For a Volvo, it is already nearing 20 years.

- Advances in automobile technology are rapidly giving us the "smart car." Standard features soon will include equipment available now only as costly options--antilock brakes, active suspension, and global positioning receivers that make it all but impossible to get lost--and gadgets still under development: road-condition sensors, computer-orchestrated fuel-injection systems, continuously variable transmission, automated traffic-management systems, smart seats that tailor the air bag's inflation to the passenger's weight, and many other innovations. These all will be in common use by 2010.

- Between 2005 and 2010, fuel-efficient hybrid gas-electric cars will begin to win market share from traditional gas guzzlers.

- The United States will lag in adopting new highway technology. Though systems that allow traffic lights and the roadbed itself to interact with cars are already available, it will not be until at least 2005 that Washington begins to install them in the most heavily used roadways throughout the country.

- To reduce the number and severity of traffic accidents, trucks will be exiled to car-free lanes, and the separation will be enforced.

- Airline crashes will decline, and will involve fewer fatalities, thanks to such technical advances as safer seat design, flash-resistant fuels, and the use of satellites for navigation and communication in transoceanic flights.

IMPLICATIONS: One of the fastest-growing transport industries is trucking, in part because computers encourage "just-in-time" manufacturing. Deliveries for Internet-based companies are an expanding market for shipping.

More-efficient vehicles, especially with hybrid power trains, should begin to reduce the demand for oil by 2008, easing one of the few remaining sources of inflation.

By 2010, "smart car" technologies will begin to reduce deaths due to auto accidents in the United States and Europe.

THE PACE OF TECHNOLOGICAL CHANGE ACCELERATES WITH EACH NEW GENERATION OF DISCOVERIES AND APPLICATIONS.

- The design and marketing cycle--idea, invention, innovation, imitation--is shrinking steadily. Thus, products must capture their market quickly, before the competition can copy them. As late as the 1940s, the product cycle stretched to 30 or 40 years. Today it seldom lasts 30 or 40 weeks.

- Industry will adopt new production technologies as rapidly as they can be developed.

- Computer-aided design in the automobile and other industries shortens the lag time between idea and finished design.

- All the technological knowledge we work with today will represent only 1% of the knowledge that will be available in 2050.

IMPLICATIONS: Industries will face much tighter competition based on new technologies. Those who adopt state-of-the-art methods first will prosper. Those who ignore them eventually will fail.

IMPORTANT MEDICAL ADVANCES WILL CONTINUE TO APPEAR
ALMOST DAILY.

- Medical knowledge is doubling every eight years.
- The Human Genome Project has already begun to yield promising new treatments for genetic disease. Already, this research has yielded possible cures for hemophilia, cystic fibrosis, familial hypercholesterolemia, a variety of cancers, and AIDS. Eventually, some 4,000 hereditary disorders may be prevented or cured through genetic intervention. Many such treatments will enter clinical testing by 2005.
- The discovery that a hormone called human chorionic gonadotropin, or hCG, appears in all cancer cells tested thus far, and (among adults) only in cancer cells, seems to promise the development of a generalized "cure for cancer." If early tests pan out, by 2010, and possibly sooner, tumors will be treated routinely and successfully with simple injections in the family doctor's office.
- Because of these and other advances, the need for hospital and hospice care could plummet. Except where surgery is required, most patients will be treated at home by nurse practitioners, physician's assistants, technicians, and other non-physician providers. When we eventually come to the end of our days, any final illness is likely to require brief hospice care, not the protracted hospital stay that many of us have come to fear.
- By 2005, artificial blood will begin to stretch the supply of blood, which is expected to fall short of demand by about 4 million units per year for the next 30 years.
- Memory-enhancing drugs should reach clinical use by 2010.
- The ethical issues raised by technologies such as organ transplants, artificial organs, genetic engineering, cloning, and DNA mapping will cause a growing

public debate. Among the key problems: surrogate motherhood, how to distribute medical resources equitably, when to terminate extraordinary life-support efforts, and whether fetal tissues should be transplanted to adults in order to combat disease. In the end, these debates will be resolved on the side of disease prevention. Therapies designed to correct or prevent genetic defects will be accepted. Elective procedures intended to change eye or skin color, or even for generally desirable goals, such as to improve intelligence or physical stamina, will be banned.

- New computer-based diagnostic tools will give doctors unprecedented images of soft and hard tissues inside the body, eliminating much exploratory surgery.

- "Magic bullet" drug-delivery systems will make it possible to direct enormous doses of medication exactly where they are needed, sparing the rest of the body from possible side effects. This will improve therapeutic results in many conditions that require the use of powerful drugs.

- "Bloodless surgery" using advanced lasers will reduce patient trauma, shorten hospital stays, and help lower medical costs.

- Brain-cell and nerve-tissue transplants to aid victims of retardation, head trauma, and other neurological disorders will enter clinical use by 2005. So will heart repairs using muscles from other parts of the body. Transplanted animal organs will find their way into common use. Laboratory-grown bone, muscle, and blood cells also will be used in transplants.

- Pacemakers will contain built-in shockers (like the paddles in the emergency room), saving heart patients even before emergency medical personnel arrive.

- In the next 10 years, we expect to see more and better bionic limbs, hearts, and other organs; drugs that prevent disease rather than merely treating symptoms; and body monitors that warn of impending trouble.

- Surgeons working via the Internet will operate on patients in remote areas, using robot manipulators.

- By 2006, 10% of prescriptions will be filled over the Internet, just as prescription drugs have been bought by mail order since the 1970s.

- "Nutraceuticals" and "foodaceuticals"--nutritional supplements and foods with drugs either added or genetically engineered into them--will be one of the hottest product areas in the health-care industry for the next 20 years.

- By 2025, the first nanotechnology-based medical therapies should reach clinical use. Microscopic machines will monitor our internal processes, remove cholesterol plaques from artery walls, and destroy cancer cells before they have a chance to form a tumor.

IMPLICATIONS: Even without dramatic advances in life extension, baby boomers are likely to live much longer, and in better health, than anyone now expects.

Five of the 10 fastest-growing jobs in the next decade will be in the health-care industry, but this hiring frenzy will play itself out by 2025. Nearly all of these jobs will require at least two years of college-level training, and many will require four.

THE INTERNET IS GROWING LOGARITHMICALLY AND GLOBALLY.

- By 2005, the global population of Net users will reach at least 300 million. At this rate, by 2010 some 95% of the people in the industrialized world and half of those in the developing world will be online.

- By 2002, the Africa ONE project will ring that continent with broadband fiber-optic lines capable of carrying 40 gigabits of data per second--enough to provide high-speed Net access for all of Africa. [Details: www.africaone.com.]

- India had 650,000 Internet subscribers in 1999. It expects to have 4 million by the end of 2001, 8 million a year later.

- Despite Beijing's desire to control communications, Net service is expanding rapidly in China. By 2003, China could have as many as 33 million people online and 85 million by 2005--but that is still less than 7% of the population.

- In contrast, 60% of Japan's population will be online by 2005.

- By 2010, most of the United States will be "wired" for high-speed data access. By 2015, most of the rest of the world will follow.

- Most Internet communication is commercial, business-to-business, rather than personal e-mail.

- Internet-based commerce will achieve sales of over \$1 trillion per year by 2002, in part because the Internet is the largest tax-free zone in the world.

IMPLICATIONS: Estimated world savings in business expenses thanks to B2B sales and services on the Internet: \$1.3 trillion by 2002.

Internet-based operations require more sophisticated, knowledgeable workers. Technically trained people will be in short supply for the next 15 years, as virtually every business in the world competes for their services.

High-speed communication is allowing companies to focus on their core competencies, spinning off secondary functions and support services--such as delivery and customer support--to third parties.

□TRENDS□ IN LABOR FORCE AND WORK

EDUCATION AND TRAINING ARE EXPANDING THROUGHOUT SOCIETY.

- In the decade that began in 1997, some 6,000 new schools and 190,000 new teachers will be needed in the United States.
- Also needed: an annual \$10 billion increase in federal spending for programs such as Head Start, federal aid for disadvantaged children, the Job Corps, and the Job Training Partnership Act.
- The half-life of an engineer's knowledge today is only five years; in 10 years, 90% of what an engineer knows will be available on the computer. In electronics, fully half of what a student learns as a freshman is obsolete by his senior year.
- Eighty-five percent of the information in National Institutes of Health computers is upgraded in five years.
- Rapid changes in the job market and work-related technologies will necessitate increased training for virtually every worker.
- Automation, international competition, and other fundamental changes in the economy are destroying the few remaining well-paid jobs that do not require advanced training.
- In the next 10 years, close to 10 million jobs will open up for professionals, executives, and technicians in the highly skilled service occupations. However, many of these positions may be for part-time workers.
- A substantial portion of the labor force will be in job retraining programs at any moment. Much of this will be carried out by current employers, who have come to view employee training as a good investment.

- Schools will train both children and adults around the clock. The academic day will stretch to seven hours for children; adults will use much of their remaining free time to prepare for their next job.

- State, local, and private agencies will play a greater role in training by offering more internships, apprenticeships, pre-employment training, and adult education.

- We already are seeing a trend toward more adult education. One reason is the necessity to train for new careers as old ones are displaced or boomers grow bored with them. The other is the need of healthy, energetic people to keep active during retirement.

IMPLICATIONS: Even small businesses must learn to see employee training as an investment, rather than an expense. Motorola estimates that it reaps \$30 in profits for each dollar it spends on training. IBM and Xerox put their profits at \$20 to \$25 per dollar of training.

Both management and employees must get used to the idea of lifelong learning. It will become a significant part of work life at all levels.

As the digital divide is erased and minority and low-income households buy computers and log onto the Internet, groups now disadvantaged will be increasingly able to educate and train themselves for high-tech careers.

SPECIALIZATION IS SPREADING THROUGHOUT INDUSTRY AND THE PROFESSIONS.

- For doctors, lawyers, engineers, and other professionals, the size of the body of knowledge required to excel in a particular area precludes excellence across all areas.

- The same principle applies to artisans. Witness the rise of post-and-beam homebuilders, old-house restorers, automobile electronics technicians, and mechanics trained to work on only one brand of car.

- The information-based organization is dependent upon its teams of task-focused specialists.

- Globalization of the economy calls for more independent specialists. For hundreds of tasks, corporations will turn to consultants and independent contractors who specialize more and more narrowly as markets globalize and technologies differentiate.

IMPLICATIONS: This trend creates endless new niche markets to be served by small businesses. It also brings more career choices, as old specialties quickly become obsolete, but new ones appear even more rapidly.

SERVICES ARE THE FASTEST-GROWING SECTOR OF THE GLOBAL ECONOMY.

- Retail sales grew from \$2.2 trillion in 1994 to an estimated \$2.7 trillion in 1998, an increase of 22.7% in four years, according to Plunkett's Retail Industry Almanac 1999-2000. These are U.S. figures, but the same **trends** are apparent in other countries.

- Hospital-industry revenues rose nearly 5% from 1993 to 1998, to \$348.7 billion.

- Business-service sales grew by 24%, to \$945.1 billion, between 1993 and 1998.

- The service sector employed 70% by 1990 and soon will grow to nearly 90%.

- Service jobs have replaced many of the well-paid positions lost in manufacturing, transportation, and agriculture. These new jobs, often part time, pay half the wages of manufacturing jobs. On the other hand, computer-related service jobs pay much more than the minimum for those with sound education and training.

- Some of the fastest growth is in some of the least-skilled occupations. Between 1996 and 2006, the number of cashiers needed by U.S. industries will rise to more than 3.6 million, up 17% for the decade. Openings for retail salespersons will rise by 10%, to nearly 4.5 million. Similar **trends** are seen elsewhere.

- Only 1 million new jobs will appear in the less skilled and laborer categories in the next decade.

IMPLICATIONS: Services are now beginning to compete globally, just as manufacturing industries have done over the last 20 years. By creating competitive pressure on wages in the industrialized lands, this trend will help to keep inflation in check.

The growth of international business will act as a stabilizing force in world affairs, as most countries find that conflict is unacceptably hard on the bottom line.

WOMEN'S SALARIES ARE BEGINNING TO APPROACH EQUALITY WITH MEN'S.

- Women's salaries in the United States grew from 61% of men's in 1960 to 74% in 1991. This figure soon will top 83%.

- In the future, women's average income could exceed men's. College graduates enjoy a significant advantage in earnings over peers whose education

ended with high school. Today, some 70% of young American women enroll in college, compared with only 64% of young men.

- To the extent that experience translates into prestige and corporate value, older women should find it easier to reach upper-management positions. They will strengthen the nascent "old girl" networks, which will help to raise the pay scale of women still climbing the corporate ladder.

IMPLICATIONS: More new hires will be women, and they will expect both pay and opportunities equal to those of men.

Competition for top executive positions, once effectively limited to men, will intensify even as the corporate ladder loses many of its rungs.

The glass ceiling has been broken. There are more high-level jobs, and headhunters are looking for anyone who can fill them. In the current tight labor market, being a woman is no longer a disadvantage.

WORKERS ARE RETIRING LATER AS LIFE EXPECTANCY STRETCHES.

- This trend has barely begun. By 2010, we expect the retirement age to be delayed well into the 70s. Benefits may also continue their decline, and they will be given based on need, rather than as an entitlement.

- The Social Security retirement age will be pushed from 65 to 67, and probably to 70.

- The military retirement age will be extended, and benefits will be converted to Social Security.

- The civil service retirement plan will also be converted to Social Security.

- People increasingly will work at one career, "retire" for a while (perhaps to travel) when they can afford it, return to school, begin another career, and so on

in endless variations. True retirement, a permanent end to work, will be delayed until very late in an extended life.

- In the long run, it may prove impossible to maintain the tradition of retirement, except through personal savings and investment.

- People are now starting to phase into retirement, cutting back from full-time work to part time, and reducing their hours in stages.

IMPLICATIONS: Now that the penalty on earnings of Social Security recipients has been rescinded, more American retirees will return to work, and those not yet retired will be more likely to remain on the job.

Older workers will partially make up for the shortage of entry-level employees. The chance to remain in the workplace will reduce the risk of poverty for many elderly people who otherwise would have had to depend on Social Security to get by.

Retirees will act as technical aides to teachers, especially in the sciences.

UNIONS ARE LOSING THEIR POWER.

- In the United States, unions enrolled 29% of employed wage and salary workers in 1975, but only 23% in 1980. By 1995, union membership had declined to less than 16%. By 2005, despite several recent successes in organizing, contract negotiations, and strikes, it will fall under 12%.

- In South Korea, where organized labor once was invincible, the government has increasingly stood up to strikes by doctors, electrical workers, car makers, and other trade groups.

- The government of Argentina, also home to powerful unions, has refused to back down in the face of opposition to a new labor law that organized workers stridently oppose.

- In Britain, where the Thatcher government broke union power in the 1980s, labor has recovered little of its former strength. In a single day, LABOURSTART UK, an Internet newspaper for union officials, announced with little comment the loss of 11,600 jobs in three separate business "downsizings."

- One reason for this decline is that jobs now are free to move around the globe from heavily unionized areas to regions where unions are less well established.

- Another reason is that the increased use of robots, CAD/CAM, and flexible manufacturing complexes can cut a company's work force by up to one-third. The surviving workers tend to be technicians and other comparatively well-educated semiprofessionals, who always have tended to resist union membership. The growing industrial use of artificial intelligence will further this trend.

- A third reason is the high cost of strikes. The once-wealthy Teamsters Union spent an estimated \$15 million on its strike against UPS in 1997, leaving only \$700,000 in its coffers--this after substantial borrowing from the AFL-CIO.

- In 10 to 15 years, American labor unions will compete with AARP to lead the battle for the rights of late-life workers and for secure retirement benefits. They face an inherent conflict between the interests of workers in what once would have been the retirement years and those of younger members, who rightly see the elderly as having saddled them with the cost of whatever benefits other generations enjoy.

- Companies will continue contracting out a growing proportion of business activities to nonunion firms.

IMPLICATIONS: For large companies, this promises greater stability in employee wages and benefits.

Unions eager to regain their membership will target any substantial company with less-skilled employees to organize. This could raise labor costs for companies that unions once would have considered too small to organize.

Democrats have been losing support from unions as organized labor declines. However, the three groups replacing unions in the power bloc--the AARP, Hispanics, and African-Americans--also have tended to vote Democratic.

The old paradigm of unions vs. corporations is obsolete. In today's economy, workers negotiate alongside management, winning shared bonuses.

SECOND AND THIRD CAREERS ARE BECOMING COMMON, AS MORE PEOPLE MAKE MID-LIFE CHANGES IN OCCUPATION.

- The fast pace of technological change makes old careers obsolete, even as new ones open up to replace them.

- People change careers every 10 years, on average.

- A recent Louis Harris poll found that only 39% of workers say they intend to hold the same job five years from now; 31% say they plan to leave their current work; 29% do not know.

- Boomers and their children will have not just two or three careers, but five, six, or even more, depending on how quickly science further extends the human life-span.

IMPLICATIONS: "Earn while you learn" takes on new meaning: Most people will have to study for their next occupation, even as they pursue their current career.

In many two-earner couples, one member or the other will often take a sabbatical to prepare for a new career.

Self-employment is becoming an increasingly attractive option, as being your own boss makes it easier to set aside time for career development. This is especially true for the members of generations X and dot-com.

Retirement plans must be revised, so that workers can transfer pension benefits from one career to the next--a change that has long been needed.

THE WORK ETHIC IS VANISHING.

- Tardiness is increasing; sick-leave abuse is common.
- Job security and high pay are not the motivators they once were, because social mobility is high and people seek job fulfillment. Some 48% of those responding in a recent Louis Harris poll said they work because it "gives a feeling of real accomplishment."
- Fifty-five percent of the top executives interviewed in the poll say that erosion of the work ethic will have a major negative effect on corporate performance in the future.
- In 1993, 60% of college freshmen business students surveyed said they would have been willing to spend three years in jail, be considered a criminal, and have a jail record if their crime would net them \$5 million. In other polls, two-thirds of American children said they would cheat to pass an important examination; 90% of adults admitted that they regularly lie; and 38% of the under-30 population said that being corrupt was "essential" in getting ahead.
- Gen X'ers watched their parents remain loyal to their employers, only to be downsized out of work. As a result, they have no corporate loyalty at all. Many will quit their job at even the hint of a better position.

- For Generation X, the post-baby-boom generation, work is only a means to their ends: money, fun, and leisure.

IMPLICATIONS: The new generation of workers cannot simply be hired and ignored. They must be coddled, paid well, and made to feel appreciated. Training is crucial. Without the opportunity to learn new skills, young people will quickly find a job that will help them to prepare for the rest of their career.

TWO-INCOME COUPLES ARE BECOMING THE NORM.

- Between 1996 and 2006, the number of women employed in the United States will grow from 61.8 million to 70.6 million, an increase of 14%.

- By 2005, 63% of working-age women will be in the labor force, up from 58.8% in 1996.

- In 75% of households, both partners will work full time by the year 2005, up from 63% in 1992.

- Look for families that usually have two incomes, but have frequent intervals in which one member takes a sabbatical or goes back to school to prepare for another career. As information technologies render former occupations obsolete, this will become the new norm.

- This emphasis on work is one big reason the richest 25% to 50% of the U.S. population has reached zero population growth. They have no time for children and little interest in having large families.

IMPLICATIONS: Demand for on-the-job child care, extended parental leave, and other family-oriented benefits can only grow. In the long run, this could erode the profitability of some American companies, unless it is matched by an equal growth in productivity.

Two-career couples can afford to eat out often, take frequent short vacations, and buy new cars and other such goods. And they feel they deserve whatever time-savers and outright luxuries they can afford. This is quickly expanding the market for consumer goods and services, travel, and leisure activities.

This also promotes self-employment and entrepreneurialism, as one family member's salary can tide them over while the other works to establish a new business.

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GENERATIONS X AND DOT-COM WILL HAVE MAJOR EFFECTS IN THE FUTURE.

Members of Generation X--roughly, the 30-something cohort--and especially of generation dot-com, now entering their 20s, have more in common with their peers throughout the world than with their parents' generation.

- There are approximately 50 million people in Europe between the ages of 15 and 24; 30 million more are between 25 and 29. The under-30 cohort represents about 22% of the European population.

- The under-20 cohort is remaining in school longer and taking longer to enter the work force than before. The age at which at least half of young Europeans either have a job or are seeking one has risen from 18 in 1987 to 20 in 1995. EU-wide, 59% of all 18-year-olds in 1995 were exclusively in education or training. The number varied from 27% in the United Kingdom to 88% in Belgium.

- Generation X should be renamed "Generation E," for entrepreneurial. Throughout the world, they are starting new businesses at an unprecedented rate.

- The younger dot-com generation is proving to be even more business-oriented, caring for little but the bottom line. Twice as many say they would prefer to own a business rather than be a top executive. Five times more would rather own a business than hold a key position in politics or government.

- Many in Generation X are economically conservative. On average, those who can do so begin saving much earlier in life than their parents did in order to protect themselves against unexpected adversity.

- They get information very quickly, from CNN and USA TODAY. Time is everything to them. They are not concerned with in-depth reporting.

IMPLICATIONS: Employers will have to adjust virtually all of their policies and practices to the values of these new and different generations. Corporate cultures built by boomers for boomers are a poor fit for tomorrow's workers.

Managers will have to find new ways to motivate and reward new-generation employees and to earn their respect. Generations X and dot-com thrive on challenge, opportunity, training--whatever will best prepare them for their next career move. Cash is just the beginning of what they expect.

For these generations, lifelong learning is nothing new; it's just the way life is. Companies that can provide diverse, cutting-edge training will have a strong recruiting advantage over competitors that offer fewer opportunities to improve their skills and knowledge base.

Generations X and dot-com are well equipped for work in an increasingly high-tech world, but have little interest in their employers' needs. They also have a powerful urge to do things their way.

As both customers and employees, they will demand even more advanced telecommunications and Net-based transactions.

The ruthless, bottom-line orientation of the new generations could drive both corporations and government to new efficiency.

ENTRY-LEVEL AND LOW-WAGE WORKERS WILL BE SCARCE.

- The declining birthrate in the 1960s and early 1970s means that fewer young people are entering the job market today. Between 1996 and 2006, the U.S. labor force between ages 25 and 34 will decline by almost 3 million people.

- The number of jobs is increasing, creating entry-level labor shortages. This problem could be acute between 2000 and 2010, especially in the service sector.

- This will open more entry-level job opportunities for high-school graduates, as companies grow increasingly willing to train them on the job.

- Colleges, business, and the military will vie for youths 16 to 24 years old, who shrank from 20% of the labor force in 1985 to 16% in 2000.

- Businesses that need beginning computer and clerical skills will be especially hard hit by this labor shortage.

IMPLICATIONS: Retirees who return to the job market offer at least a partial solution to worker shortages. Other valuable pools of potential workers tapped by some companies include stay-at-home mothers, the retarded and handicapped, and even prisoners. Adapting to their special needs will be a constant challenge for business.

Employers will see more entry-level candidates with college degrees and technical training. Generation X has, on average, two more years of college than its parents, and X'ers are almost all computer literate.

Personnel shortages could eventually hinder business operations in industries dependent on low-skilled workers in some high-demand markets.

Competition for potential entry-level workers will continue to raise labor costs for much of the next decade. Higher wages and benefits at the low end of the wage scale will be transmitted up the ladder as well.

The only ways to offset a shortage of workers is to invest in still more automation and/or on-the-job training.

TIME IS BECOMING THE WORLD'S MOST PRECIOUS COMMODITY.

- Computers, electronic communications, the Internet, and other technologies are making national and international economies much more competitive.

- In the United States, workers spend about 10% more time on the job than they did a decade ago. European executives and nonunionized workers face the same trend.

- In this high-pressure environment, single workers and two-income couples are increasingly desperate for any product that offers to simplify their lives or grant them a taste of luxury--and they can afford to buy it.

IMPLICATIONS: Stress-related problems with employee morale and "wellness" will continue to grow. Companies must help employees balance their time at work with their family lives and need for leisure.

Brand names associated with efficient, reliable service are coming to seem even more desirable among baby boomers and seniors. Among younger buyers, this is no more than a foot in the door.

As time for shopping continues to evaporate, Internet and mail-order marketers will have a growing advantage over traditional stores.

MANAGEMENT □TRENDS□

MORE ENTREPRENEURS START NEW BUSINESSES EVERY YEAR.

- Workers under 30 would prefer to start their own company, rather than advance through the corporate ranks. Some 10% are actively trying to start their own businesses, three times as many as in previous generations.

- A large majority simply distrust large institutions. Most believe that jobs cannot provide a secure economic future in a time of rapid technological change. And examples of Silicon-Valley start-ups that turned their founders into billionaires "overnight" have dramatically advanced this change of values.

- Since 1983, the number of new businesses started in the United States each year has never dipped below 600,000. In 1995, the number of new incorporations reached a record 750,000, and there were 4.5 times as many start-ups per capita as in 1950, when the post-War economic boom was gaining momentum.

- The number of self-employed people in the United States grew by nearly 1 million in the decade ending in 1996, to just over 9 million people. By 2006, it will rise to 10.2 million, according to the Bureau of Labor Statistics. We expect there to be closer to 12 million self-employed Americans in 2006.

- More women also are starting small businesses. Many are leaving traditional jobs to go home and open businesses, even as they begin a family.

- Since the 1970s, small businesses started by entrepreneurs have accounted for nearly all of the new jobs created. For much of this period, giant corporations have actually cut employment. In 1995, small, entrepreneurial businesses produced 1 million new full-time jobs vs. barely 100,000 among larger companies.

- By 2002, 80% of the labor force will be working for firms employing fewer than 200 people.

IMPLICATIONS: This is a self-perpetuating trend, as all those new service firms need other companies to handle chores outside their core business.

Specialty boutiques will continue to spring up on the Internet for at least the next 20 years.

INFORMATION-BASED ORGANIZATIONS ARE QUICKLY DISPLACING THE OLD COMMAND-AND-CONTROL MODEL OF MANAGEMENT.

- The typical large business is struggling to reshape itself. Soon, it will be composed of specialists who rely on information from colleagues, customers, and headquarters to guide their actions.

- Management styles will change as upper executives learn to consult these skilled workers on a wide variety of issues. Employees will gain new power with the authority to make decisions based on the data they develop.

- Decision processes, management structure, and modes of work are being transformed as businesses learn to use information generated by computer--data that have been analyzed, synthesized, and organized in useful ways.

- Information-based organizations require more specialists, who will be found in operations, not at corporate headquarters. R&D, manufacturing, and marketing specialists will work together as a team on all stages of product development rather than keeping each stage separate and distinct.

- Upper management will no longer give detailed orders to subordinates. Instead, it will set performance expectations for the organization, its parts, and its specialists and supply the feedback necessary to determine whether results have met expectations.

IMPLICATIONS: "Downsizing" increasingly will spread from manufacturing industries to the service economy. Again, this process encourages the entrepreneurial trend, both to provide services for companies outsourcing their secondary functions and to provide jobs for displaced employees.

A TYPICAL LARGE BUSINESS IN 2010 WILL HAVE FEWER THAN HALF THE MANAGEMENT LEVELS OF ITS COUNTERPART IN 1990, AND ABOUT ONE-THIRD THE NUMBER OF MANAGERS.

- Computers and information-management systems have stretched the manager's effective span of control from six to 21 subordinates. Information now flows from front-line workers to higher management for analysis. Thus, fewer mid-level managers are needed, flattening the "corporate pyramid."

- Downsizing, restructuring, reorganization, outsourcing, and cutbacks of white-collar workers will continue through 2006.

- However, many companies are finding it necessary to bring back older workers, so as to preserve an effective corporate memory.

- Opportunities for advancement will be few because they will come within the narrow specialty. In 2001, only one person for every 50 will be promoted; in 1987, it was one person for every 20.

- Information-based organizations will have to make a special effort to prepare professional specialists to become business executives and leaders.

IMPLICATIONS: Top managers will have to be computer-literate to retain their jobs and must make sure they achieve the increased span of control that computers make possible.

One reason there are fewer managers is that the work they oversaw is now being contracted out. This offers new markets for the firms that now handle their chores.

Finding top managers with the broad experience needed to run a major business already has become difficult and can only grow more so as the demand for specialization grows.

Executives increasingly will start their own companies, rather than trusting the old-fashioned corporate career path to provide advancement.

One way to keep the best employees where promotion is not an option is to encourage INTRApreneurship and offer profit-sharing.

GOVERNMENT REGULATIONS WILL CONTINUE TO TAKE UP A GROWING PORTION OF THE MANAGER'S TIME AND EFFORT.

- Since the U.S. Congress passed regulatory reform laws in 1996, more than 14,000 new regulations have been enacted. At least 200 have effects sufficiently sweeping to be rated "major." Not one proposed regulation was rejected during this period. The FEDERAL REGISTER, where proposed and enacted regulations are published, was nearly 50% larger in 1998 than it had been 10 years earlier-- 50,000 pages in all.

- This is not solely an American trend. The Brussels bureaucrats of the European Union are churning out regulations at an even faster rate, overlaying a standard regulatory structure on all the national systems of the member countries.

IMPLICATIONS: Regulations--though both necessary and unavoidable--amount to a kind of friction that slows both current business and future economic growth. Their proliferation in the developed world could give a competitive advantage to countries such as India and China, where regulations governing investment and capital flow are being stripped away, while health, occupational safety, and environmental codes are still rudimentary or absent. Other lands, such as Russia, will remain at a competitive disadvantage until they can pass and enforce the regulations needed to ensure a stable, fair business environment.

INSTITUTIONAL □TRENDS□

MULTINATIONAL CORPORATIONS ARE UNITING THE WORLD, BUT ALSO GROWING MORE EXPOSED TO ITS RISKS.

- By 2005, parts for well over 50% of the products built in the United States will originate in foreign countries.

- Multinational corporations that rely on indigenous workers may be hindered by the increasing number of AIDS cases in Africa and around the world. Up to 90% of the population in parts of sub-Saharan Africa reportedly tests positive for HIV in some surveys. Thailand is equally stricken, and many other parts of Asia show signs that the AIDS epidemic is spreading among their populations.

- The continuing fragmentation of the post-Cold War world has reduced the stability of some lands where government formerly could guarantee a favorable--or at least predictable--business environment. The current unrest in Indonesia is one example.

- One risk now declining is the threat of currency fluctuations. In Europe, at least, the arrival of the euro should eventually make for a more stable economic milieu.

IMPLICATIONS: It is becoming ever more difficult for business to be confident that decisions about plant location, marketing, and other critical issues will continue to appear wise even five years into the future. All long-term plans must include an even greater margin for risk management. This will encourage even greater outsourcing, rather than investment in offshore facilities that could be endangered by sudden changes in business conditions.

Countries that can demonstrate a significant likelihood of stability will enjoy a strong competitive advantage over neighbors that cannot. Witness the rapid growth of investment in India now that deregulation and privatization have

general political support, compared with other Asian lands where conditions are less predictable.

THIS INTERNATIONAL EXPOSURE INCLUDES A GREATER RISK OF TERRORIST ATTACK.

- The continuing tensions between Israel and its neighbors--the Palestine Liberation Organization, Jordan, Syria, and Lebanon--remain one major source of terrorist activity, at least temporarily.

- State-sponsored terrorism is on the decline, as tougher sanctions make it more trouble than it is worth.

- The American policy of paying informants to identify terrorists and warn of planned incidents also is inhibiting violence by the larger, better established groups.

- However, nothing will prevent small, local political organizations and special-interest groups from using terror to promote their causes.

- On balance, the amount of terrorist activity in the world is likely to go up, not down, in the next 10 years.

IMPLICATIONS: Western corporations may have to devote more of their resources to self-defense, while accepting smaller-than-expected profits from operations in the developing countries.

Where terrorism is most common, countries will find it impossible to attract foreign investment, no matter how attractive their resources.

Though Islamic terrorists form only a tiny part of the Muslim community, they have a large potential for disruption throughout the region from Turkey to the Philippines.

CONSUMERS INCREASINGLY DEMAND SOCIAL RESPONSIBILITY FROM COMPANIES AND EACH OTHER.

- Companies increasingly will be judged on how they treat the environment. For example, nuclear power plant controversies are now seen in the light of the Chernobyl nuclear accident.

- Safety testing of children's products also enforces corporate responsibility. One company recently was forced to recall no fewer than 7 million child car seats.

- Auto seat belts and air bags, especially seat-belt-use laws, extend to personal as well as corporate behavior.

- Testing for AIDS and drug abuse carries the demand for responsibility into intimately personal acts.

- Government intervention will supplant deregulation in the airline industry (in the interest of safety and services), financial services (to control instability and costs), electric utilities (nuclear problems), and the chemical industry (toxic wastes).

- With 5% of the world's population and 66% of the lawyers on the planet, American citizens will not hesitate to litigate if their demands are not met.

IMPLICATIONS: For industry, this represents one more powerful pressure to adopt "environmentally friendly" technologies, to work with area schools and community groups, and to participate in other local activities. It also represents an opportunity to market to environmentally concerned consumers.

As the Internet spreads Western attitudes throughout the world, environmental activists in other regions will find ways to use local court systems

to promote their goals. Litigation is likely to become a global risk for companies that do not make the environment a priority.

INSTITUTIONS ARE UNDERGOING A BIMODAL DISTRIBUTION: THE BIG GET BIGGER, THE SMALL SURVIVE, AND THE MIDSIZED ARE SQUEEZED OUT.

- By 2005, twenty major automakers around the world will hold market shares ranging from 18.1% (GM) to 1.0% (BMW). By 2010, there will be only five giant automobile firms. Production and assembly will be centered in Korea, Italy, and Latin America.

- By 2005, just three major corporations will make up the computer hardware industry: IBM, Compaq, and Dell.

- Seven domestic airlines in the United States today control 80% of the market, leaving the smaller domestic carriers with only 20%. The most recent consolidation is the "alliance" between Continental and Northwest. By 2005 there will be only three major domestic carriers.

- Between 1992 and 1997, there were nearly 3,300 mergers and acquisitions in the food industry alone, including foreign takeovers. These are U.S. data, but EU figures reflect the same trend.

- Where local regulations allow, mergers and acquisitions are an international game. Witness the takeovers of the United States MCI by WorldCom in the United Kingdom and of Chrysler by DaimlerBenz. The continuing removal of trade barriers among EU nations will keep this trend active for at least the next decade.

- Manufacturers often sell directly to the dealer, skipping the wholesaler or distributor.

- The 2000s will be our second decade of micro-segmentation as more and more highly specialized businesses and entrepreneurs search for narrower niches. These small firms will prosper, even as midsized, "plain vanilla" competitors die out. This trend extends to:

*RETAIL: Big chain department stores and giant discounters succeed. So do small boutiques.

*HOTELS: Both large, luxurious hotel chains and economy hotels are thriving. Mid-priced family operations are being squeezed out.

*RESTAURANTS: Both elegant dining and cheap, fast-food restaurants are making it at the expense of sit-down family restaurants. (However, lower-end restaurants are beginning to come under pressure from competition by the elaborate take-out departments of the larger supermarkets.)

*HOSPITALS: Large hospital corporations and small walk-in medical centers are flourishing. Independent hospitals and small chains are being absorbed by the large corporations. Consolidation will accelerate even further as it becomes more difficult to squeeze new savings from the delivery of care and providers must invest in costly new data systems for administration, finance, and customer service.

*AGRICULTURE: The farmer making over \$500,000 is flourishing; the farmer who makes under \$100,000 is surviving on nonfarm income; the middle-income farmer is going bankrupt.

*BANKS: Interstate and international banks are growing rapidly; at the other end of the spectrum, local banks that emphasize service are succeeding.

*FINANCIAL INSTITUTIONS: Small, local brokers are prospering, while independents merge to survive.

- This trend leads us to believe that AT&T may be reconsolidated by 2010.

- "Boutique" businesses that provide entertainment, financial planning, and preventive medical care for past-their-prime baby boomers will be among the fastest-growing segments of the U.S. economy.

IMPLICATIONS: Thus far, industries dominated by small, regional, often family-owned businesses have been relatively exempt from the consolidation now transforming many other businesses. Takeovers are likely even in these industries in the next decade.

This consolidation will extend even to Internet-based businesses, where well-financed companies will try to absorb or out-compete tiny online start-ups, much as they have done in the brick-and-mortar world.

No company is too large to be a take-over target if it dominates a profitable market or has other features attractive to profit-hungry investors.

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